Mobilizing an action research programme in a live construction project setting

MOBILIZING AN ACTION RESEARCH PROGRAMME IN A LIVE CONSTRUCTION PROJECT SETTING[1]

Building on previous work addressing Action Research (AR) in the construction management field, this paper examines the application of AR methods and techniques on a project pioneering a new form of project insurance: IPI (Integrated Project Insurance). The practicalities of mobilizing a sustained AR programme on a live construction project are explored as the relationship between innovation (IPI), professional practice and academic research enquiry are juxtaposed. The methodological challenges and perceived values of AR are re-evaluated in the light of practitioner opinion and industry desire to learn and improve practices across the sector. The empirical insights facilitate a re-assessment of AR in a construction project context in 4 distinct ways: the nature of the AR learning loop is clarified for a construction project context; the role of project participants in the AR process are examined; the workings of AR "interventions" are explored and the rationale and philosophical assumptions underlying an AR programme in a construction management domain are re-assessed. The informative insights will assist researchers considering an AR programme whilst the supportive recognition of professionals highlights how AR is a potentially valuable approach for industry and academia to work together to create knowledge and refine practice co-operatively.

Keywords: Action Research, Collaboration, Innovation, Research Methods.

INTRODUCTION

As a research method, Action Research (AR) acknowledges the role of the researcher as an active participant in the project or process being examined; its focus being on doing research with and for the "project actors" to produce practical, useful knowledge (Reason & Bradbury, 2007). AR is as an alternative to "disinterested social science models" (Reason, 2003) where the researcher is a detached observer and examiner of the subject under study; AR is often proposed as a research method that improves practices, generates knowledge and brings about change in specific contexts (Eden & Huxham, 1996; Parkin, 2009). Whilst AR studies have previously been conducted in the construction project domain (c.f. Connaughton & Weller, 2013), such work has often failed to inform or assist other researchers considering an AR approach for their own projects. Moreover, the unique ways in which AR influences the dynamics of a live construction project have often been overlooked ,

[1] The project reported here is part of the Innovate UK's (formerly the Technology Strategy Board) Rethinking the Build Process programme and acknowledgement is made of the financial support provided by that programme. Specific results and their interpretation remain the responsibility of the project team.

and discussion of the theoretical and philosophical basis of AR as a research methodology has been muted. This paper begins to address such issues by exploring the application of AR on a construction project pioneering the use of Integrated Project Insurance (IPI) to facilitate greater collaborative working amongst construction project partners. The paper provides a continuation of the work reported by Connaughton & Weller (2013), and examines the application of AR techniques on a construction project called 'Advance II' for Dudley College in the UK..

The paper aims to enhance scholarly understanding of the application of AR in the construction management domain. It explores some of the methodological issues of mobilizing AR in a live construction project setting , and examines and critiques the role of participants and the nature of AR "interventions" over the project lifecycle. In particular, it examines the implications of adoping the AR 'learning stage loop' (Baskerville, 1999) in a construction context. Further, the the implications for AR researchers of working in the commercial environment of construction are also examined.

The paper begins with an overview of AR as a research method and explains the rationale for its adoption on the Advance II project. The Advance II project and its novel features relating to the adoption of Integrated Project Insurance are then describedThe specific methods of mobilizing AR are then detailed, and issues and problems experienced by the researcher embedded in the construction project are described. The discussion explores the methodological basis of AR, the role of participants and the nature of the AR "interventions" on the project, ending with a re-appraisal of the AR 'learning stage loop'. The theoretical and philosophical assumptions underlying an AR study are then re-considered for a construction project context where commercial and academic worlds meet and intertwine.

Action Research

Action research (AR) with its strong pedigree of social justice and community action (Reason, 2003) is fundamentally different to other research methods as it actively and intentionally endeavours to effect a change in a (social) system (Lewin, 1946). It typically aims to bring about change in specific contexts (Parkin, 2009) and requires "the active participation of the researcher in the process under study, in order to identify, promote and evaluate problems and potential solutions." (Fellows & Liu, 2003, p.21). AR has a dual goal of improvement and of generating knowledge (Eden & Huxham, 1996) but is also heavily context dependent, being neither standardised nor permanent. Therefore, AR is reliant on the project context and the knowledge, perceptions and subjectivities of persons involved (including the researcher, who should be actively contributing to the project itself). The origins and development of AR as a research method are outlined by Connaughton & Weller (2013) in a paper that also reviewed the history of AR in the construction management domain. Fundamental to AR is "action" rather than theoretical positioning, and these "actions" need to function effectively if the AR method is to work at all; such actions being planned in advance as part of a distinct research process cycle. The emphasis upon "action" has resulted in "models" of how "to do" AR. For example, Al-Balushi et al. (2004) and Azhar et al. (2010) argued that AR could be understood as a 5-step process, as in figure 1 below.

Figure 1: the 5 step Action Research process (based on Al-Balushi et al. 2004 and Azhar et al. 2010)

The study reported in this paper follows such a 5-step process, and also follows the recommendation of Baskerville (1999), Argyris & Schon (1978) and Greenwood & Levin (2007) in using specific "learning stage loops" to reflect collectively on the project workings. The AR learning stage loop cycle is depicted in figure 2 and explained further under 'Planning an AR Programme' below.

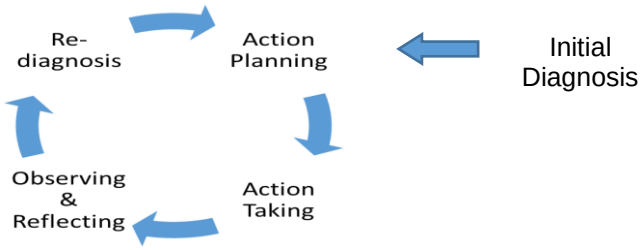

Figure 2: an Action Research learning stage loop (based on Baskerville, 1999)

The AR learning stage loop is essentially an enhancement of the 5 step AR process: each of the 5 steps being present in the AR learning stage loop minus the Re-diagnosis stage and the re-iterative cycle indication. This paper adds more detail regarding how the AR learning stage loop model works in actuality when mobilized in a live construction project setting as the role of participants and the nature of AR interventions are also examined.

The Advance II project

Dudley College, a further education institute in the UK West Midlands was actively seeking to procure a new facility (Advance II) to deliver their vocational training programmes. Integrated Project Insurance (IPI), a new approach to construction project insurance developed by Integrated Project Initiatives Ltd, a consultancy, was considered by the College for its potential to support improved collaborative working among design and construction team members and thereby enhance project outcomes. Conventional insurance arrangements require each construction designer and constructor to insure for their individual liabilities, and are believed to promote risk avoidance by team members and inhibit effective collaboration between them (Cabinet Office, 2012). IPI insures all the major project participants collectively, as a single entity (a 'virtual company'), and is intended to promote improved collaborative working in the design and construction team leading to the development of cost-effective, shared solutions to design challenges (Integrated Project Initiatives Ltd, 2014).

Dudley College, supported by Integrated Project Initiatives Ltd, appointed a design and construction team early in 2015 to trial these new IPI arrangements on its Advance II facility. The project was included in the UK Cabinet Office 'Trial Projects' programme for monitoring new models of construction procurement (Cabinet Office, 2012) and the University of Reading (UoR) was appointed as academic partner on an Innovate UK (IUK)-supported research project to examine the performance of IPI on Advance II. A researcher was appointed, being embedded into project activities as much as possible (i.e. attending project meetings; receiving project correspondence; accessing the project Common Data Environment (CDE)).

This trial project represents the first formal adoption of IPI in UK construction. As such, the project parties required an opportunity to learn and improve through a managed cycle of research activities as the project progressed through key stages. An AR programme was therefore considered an appropriate and potentially helpful methodology,, with the project researcher actively engaging, contributing and reflecting on the workings of the project with the actors themselves. In doing so, the researcher would integrate with the team as much as possible (whilst endeavouring not to impede or disrupt their work), creating a field for discussion and interpretation of processes and events (Fellows & Liu, 2003) involving researcher and participants.

Planning an AR Programme

A participant/practical approach was adopted for the Advance II project so that diagnosing and action planning would be executed in collaboration with the project players (Chein et al. 1948), such actions involving the active participation and co-operation of practitioners (Zuber-Skerritt, 1996). This approach is in line with the 'Northern tradition' of AR (Brown 1993), concerned mainly with group problem solving for a practical outcome within a commercially-oriented organisational context. More specifically, it is intended to maximize learning and give the project team further assistance with their work although any learning activities need to be carefully managed so as to not interfere with project work. On Advance II, the AR programme was conducted concurrently by 2 parties:

- The UoR researcher reported to IUK whilst assisting the team.
- The IPI Independent Facilitators guided the team (as mentors), continually reflecting on how IPI was working on the trial project.

The academic researcher was primarily responsible for observing and recording project practices, events and performance to help understand the operation of the IPI approach, whilst the Facilitators were focused upon assisting and guiding the project team with their tasks. Therefore, although AR rejects a "self-imposed distance from the world of action" (Dash, 1999, p.479), the researcher on this project did periodically need to distance himself from activities in order to reflectively review progress and performance. An important element of the approach to AR on this project therefore was the learning stage loop (figure 2) with its strong focus on a cycle of learning and improvement activities helped by both the academic researcher and Independent Facilitators, albeit in different ways and for different purposes. This approach was adopted as a formal element of the research design on this project, in contrast to some of the more implicit approaches to AR adopted in less specific ways (e.g. Miller and Doree, 2008; Chan and Moehler, 2007). The effectiveness and practicalities of the AR learning stage loop are reviewed later in the paper.

Mobilizing AR on Advance II

Introduction and obtaining consent

An essential starting point for the study was to introduce the AR research programme and obtain practitioner consent. This is a necessary activity for all research studies (not just AR), but was particularly delicate on Advance II as the project was the first live trial of IPI in the UK, and a UK Cabinet Office 'trial project', likely to generate significant outside interest. Although the usual obstacles and problems of negotiating access to a project (Laryea & Hughes, 2011) were not encountered (the UoR being part of an IUK-supported research consortium that included Integrated Project Initiatives Ltd, who were also the Advance II project facilitators), obtaining the active co-operation of the Alliance partners was an important issue meriting targeted activity. A formal approach was made to the Dudley College client and the Alliance Board (responsible for project delivery). The project partners recognized the academic merit of the study and were comfortable with the research approach to be adopted. The researcher was then invited to join the project provided that any commercially sensitive data would be safeguarded and data anonymized and protected.

Diagnosis and action planning

With the formation of the Alliance (essentially the governance body for the integrated design and construction team) and signing of an Alliance Contract for Advance II, a multitude of issues quickly demanded attention and action (e.g. design development; cost planning; procurement strategy; opportunity/risk management; people resource costs). Following the AR learning stage loop (figure 2), diagnosis and action planning were initially executed separately by the researcher and Independent Facilitators. The researcher attended both Alliance Board and more detailed team meetings on design development from the beginning of the project, sitting alongside other team members directly at the 'board table' itself (i.e. not being inconspicuous, at the rear of the room), commenting and contributing to discussions when appropriate. These verbal contributions were managed very carefully and sensitively by the researcher for several reasons. Firstly, too many verbal interventions could be seen as disrupting the practitioners' work; secondly, time was a valuable resource for all members of the project team; and thirdly, the researcher had limited knowledge of some technical issues discussed (an ill-informed comment or question may have been viewed as 'slowing down' the work of Alliance partners by requiring them to explain matters). The researcher continually observed and reflected upon the work of the Alliance through meeting attendance and becoming more known to team members as time progressed. For their part, the Facilitators were integral participants at Board meetings, contributing more vocally at meetings than the researcher and advising and guiding the team on best practices when working in an IPI way. As project work progressed, certain issues became more problematic for the Alliance than others, such as agreeing an overall procurement strategy, establishing a collective understanding of risk and opportunity management and re-stating behavioural expectations for project participants. These provided the main focus of the facilitated interventions (the 'action taking' of the AR learning stage loop, figure 2).

Action Taking: Facilitated Interventions

Integral to action taking were the facilitated interventions undertaken by the Independent Facilitators and, to a different degree, the researcher. These interventions were designed to assist project partners with their work and generate data to help understand the operation of the IPI approach. The Independent Facilitators made many interventions during the course of the project, designed explicitly to improve the

operation and effectiveness of the IPI model. In addition to their verbal and written contributions (at meetings; via email; telephone/skype calls), there were numerous Facilitator-led interventions, including the following:

- Plan in a Day & Build in a Day workshops facilitated focused Alliance discussion around an evolving 3D building model
- IPI training sessions: targeted assistance with workings of the IPI "gain/pain share"; Alliance Contract terms & ideal procurement strategy
- Refresher coaching: covering the principles underlying the IPI approach and the behaviours expected of project participants.

Whilst undertaking these interventions, both Facilitators and researcher observed and reflected upon their use with the Alliance. This led to a sharing of ideas of how they could be done differently for subsequent interventions (i.e. the re-diagnosis in the AR learning loop). As a result, several were done differently for the next iteration. For example, the format and attendance list for the 'Build in a Day' workshops were revised 2nd and 3rd time around to maximize supplier input; collaborative working principles were more forcibly communicated at refresher coaching sessions in later phases of the project. These are examples of "double-loop" learnings (Greenwood & Levin, 2007): those that explicitly acknowledge the context of use within which interventions are mobilized in order to improve their effectiveness.

It is also appropriate, in the context of AR, to consider some actions undertaken by the researcher as interventions. These were aimed at assisting project partners to identify learning that could support the adoption of IPI. Such interventions included:

- Board presentations: to provide an independent view of project performance
- Lessons Learned discussions: enabling team members to reflect collectively on working practices and overall performance
- Reflective Opportunities: individual interviews; small group interviews & questionnaire dissemination provided the researcher with data whilst also enabling project players to reflect and re-consider issues themselves, leading to potential changes on the project
- Specific suggestions: the researcher contributed verbally at meetings with ideas (e.g. suggesting explanation of calculations of the Commercial Alignment should be included in the Alliance Contract Annex; encouraging partners to apply for Corporation Tax Relief as part of an R&D project)

These interventions were managed carefully. For example, interviews with Alliance members were scheduled at convenient times; transcripts were anonymized and returned to interviewees for review (and potential retraction). Obtaining and retaining the trust and confidence of project partners throughout this AR programme was essential, so these interventions were reviewed by the researcher prior to further use.

Re-diagnosis

The AR learning stage loop (figure 2) is predicated on the assumption that an action can be repeated (following re-diagnosis and modification) for a better outcome. On Advance II, there were several examples of this occurring:

- Work Package development: following Facilitator advice, responsibility for project work packages was transferred to "Trinities" (small 3-person groups representing commercial, programming and design interests) to facilitate better management
- Procurement: initial informal approaches transformed into more formal engagements with accompanying letters of intent/modified contract terms.

- Cost management: Facilitator intervention resulted in external reviews of costs by the wider project team, enhancing collective confidence.
- Workshop formats: Plan in a Day/Build in a Day workshops formats were refined iteratively, improving outcomes for all participants.
- Coaching: group training in IPI philosophy transformed into individual coaching to help some team members to work in a collaborative project environment.
- Look Ahead review meetings: format changed following Facilitator advice to include key site supervisors, site requirements and latest information.

These examples illustrate the value of the learning stage loop in action: re-diagnosis of an issue resulting in refinement and better execution. However, it is not always possible or desirable to repeat an action for a better outcome in a construction project context. For example, the bidding and selection process cannot be repeated and numerous site activities (e.g. pipework installation; steel frame erection) should ideally only be executed once.

Discussion

The mobilization of an AR programme on Advance II enables 4 different aspects of AR to be re-evaluated: the nature of the AR learning loop; the role of project participants; the working of AR interventions and the theoretical assumptions underlying an AR programme.

The AR Learning Loop

The nature of the AR learning loop has been clarified for a construction project context. AR action planning should include careful consideration of how the researcher will become methodologically engaged in project work (e.g. some site activities will be difficult to examine). Subsequent action taking should be appropriate and considered carefully (e.g. the number of facilitated discussions held could be counter-productive). In this paper, we consider researcher verbal intercessions as interventions and a form of "re-diagnosis" or "action planning" (see Figure 2) with the potential to affect further action taking by the project participants. Such contributions distinguish an Action Researcher from a passive observer.

On Advance II, the use of AR “learning loops” proved positive; the researcher being directly engaged with project participants to gather their thoughts and opinions, with the work of the researcher and Facilitators being distinct but complementary. In this way, the AR approach resulted in a combined "co-production" of knowledge, action and outcomes (Harty and Leiringer, 2007) between researcher and Facilitators.

Role of Project Participants

Some scholars, such as Azhar et al. (2010), make compelling cases for the value of AR to improve construction industry practices, but do not discuss the social issues that inevitably arise when an “outside party” enters a project and suggests changes. Evidence from Advance II suggests this is not an insignificant issue. Firstly, there is a distinction between obtaining consent to participate in research and obtaining the agreement of the participants to the more active participation in their endeavour of the researcher. On Advance II, for example, researcher requests for information or assistance were sometimes overlooked as the team maintained a focus on their activities. Moreover, the opinions/knowledge of the researcher were rarely sought out by the Alliance partners who believed themselves to be competent in relevant technical matters. Ideally an AR researcher should be acknowledged as an active participant in the process being studied. While on Advance II, the project partners

recognized the R&D (research and development) potential of the project and did co-operate with the researcher, they did not always seek the researcher`s views to the same extent as those of the IPI Facilitators.

On construction projects, an AR researcher must expect to introduce themselves repeatedly to new people on the project, who enter at different phases of activity. Whilst there may be initial suspicion about the researcher's presence and intentions, this can be allayed via pre-prepared information sheets and through continual meetings. In a fast moving project context, new faces will frequently appear at meetings and the researcher must keep track of personnel changes and introduce themselves at appropriate times. Further clarifications may be needed of what the researcher is trying to achieve.

Seymour et al. (1997) explored the notion of objectivity in research and how researchers were often faced with a dilemma of whether or not to be seen as organisational "outsiders". On Advance II, the distinction between the interventions of the Facilitators and those of the researcher help clarify their respective roles and positions; the Facilitator interventions being oriented towards the practical, project issues and the researcher interventions providing Alliance personnel with opportunities to reflect upon and change practice. However, the distinction highlights a dilemma a researcher faces in being both an outside observer and an active project participant at the same time. On Advance II, differences in participant outlook towards the interventions of the researcher and Facilitators suggests that this dilemma was not entirely resolved, with the researcher being seen as essentially a project "outsider".

Working of AR Interventions

The researcher`s experience of AR on Advance II aligns with arguments of Henry (2000) that 3 primary requirements must exist for AR to work in practical terms: a trust-based relationship between parties; negotiated access to information and interpretation of data; an open-ended research project plan. On Advance II, the Facilitator`s role was focused upon coaching and guiding participants on conducting the construction project work in an IPI way: they were the “problem-solvers” that people often looked to when difficult issues arose. The researcher, by contrast, was more of a “background figure”, observing project progress whilst contributing periodically via comments, presentations and providing opportunities for reflection.

Theoretical assumptions of AR

Azhar et a. (2010) state that AR is not a specific method of research, but rather an approach to doing research. It can be understood as an interpretivist method for understanding human behaviour, having a distinct emphasis on reaching an empathetic comprehension of human action, and aiming to understand human behaviour rather than explaining it (Bryman & Bell, 2003). There are also assumptions about an AR programme that need to be highlighted. Whilst an AR researcher may be welcomed into the project fold, it is impossible for the researcher to be privy to all conversations and interactions occurring, particularly in a dynamic and fast-moving project and it may be inadvisable to repeatedly contact individuals for information and assistance. Additionally, keeping track of project activities may be difficult due to the intensity of work occurring, especially once a site is fully operational, though the insights reported here relate mainly to design phase work, where activity was off-site (i.e. in meetings and discussion groups).

The underlying rationale of AR posits that knowledge may be increased and performance enhanced by working closely with participants so that a "co-production" of knowledge can take place (Harty and Leiringer, 2007). However, mechanisms need to be in place to facilitate this interaction. Moreover, an AR approach is likely to produce a potentially more rich and nuanced understanding of the social realities of construction work than either a purely quantitative or qualitative analysis of the same interactions; an additional strength of AR being its` in-built reflexivity (embodied in the learning loop cycle) that encourages a critical reflection of methods used in the domain under study. On Advance II, the reflections led to improvements to multiple issues, including procurement work and work package management.

SUMMARY

The paper has provided a detailed account of AR work undertaken on the Advance II project. The use of "learning stage loops" (Baskerville, 1999), has extended the application of AR techniques in the construction management domain, whilst the account of activities and researcher experiences adds to scholarly understanding of mobilizing AR in a live construction project setting. Additionally, by detailing the methodological practicalities of employing an AR approach and the role of participants and AR "interventions" over time, a more sophisticated account of AR has been provided that builds upon simpler definitions (e.g. Fellows and Liu, 2003). The paper findings indicate the AR learning loop is a potentially effective approach for improving practices and generating knowledge, although the issues surrounding its` mobilization are significant, including obtaining the active assistance of practitioners, careful consideration of executing interventions in a live project setting and providing time for reflection and re-diagnosis. These insights indicate the value of the AR method for construction project management research as well as its` practical challenges.

REFERENCES

Al-Balushi, R A, Kaka, A and Fortune, C (2004) Project management processes and the achievement of organizational strategies – the case of telecom. operator. In: Khosrowshahi, F (Ed.), "20th Annual ARCOM conference", 1-3 September 2004, Heriot Watt University, Association of Researchers in Construction Management 1155-64.

Argyris, C and Schon, D (1978) Organizational learning: a theory of action perspective. Reading, Mass.: Addison Wesley.

Azhar, S, Ahmad, I and Stein, M (2010) Action research as a proactive research method for construction engineering and management. Journal of Construction Engineering and Management, 136 (1), 87-98.

Baskerville, R L (1999) Investigating information systems with action research. Communications of the Association of Information Systems, 2 (19), 32-42.

Brown, L D (1993) Social change through collective reflection with Asian nongovernmental development organizations. "Human Relations", 46(2), 249-73.

Bryman, A. and Bell, E. (2003). Business Research Methods, Oxford University Press, Oxford.

Cabinet Office (2012) Government construction strategy: trial projects. London, UK.

Chan, P W and Moehler, R (2007) Developing a "road-map" to facilitate employers` role in engaging with the skills development agenda. In: Boyd, D (Ed.) 23rd Annual ARCOM conference, 3-5 September 2007, Belfast, Association of Researchers in Construction Management, 33-41.

Chein, I., Cook, S W and Harding, J (1948) The field of action research. American Psychologist, 3 (2), 43-50.

Connaughton, J. & Weller, S. (2013) Improving collaboration in construction: an opportunity for action research. In Smith, S.D. (Ed.) and Ahiaga-Dagbui, D.D. (Ed.), Proceedings 29th Annual ARCOM Conference, 2-4 September 2013, Reading, UK, Assn. of Researchers in Construction Management, 1125-1134.

Dash DP (1999) Current debates in action research. Systematic Practice and Action Research, 12, 5, 457-492.

Eden, C & Huxham, C (1996) Action research for the study of organizations. In: A S Clegg, C Hardy and W Nord (Eds.), Handbook of organization studies", pp.526-542. London:Sage.

Fellows, R. & Liu, A. (2003). Research methods for construction (2nd ed), Blackwell, Oxford.

Greenwood, D J and Levin M (2007) Introduction to action research: social research for social change (2nd. Ed.). London: Sage.

Harty, C. and Leiringer, R. (2007). Social science research and construction: balancing rigour and relevance, in Hughes, W. (ed.) Proceedings of Construction Management and Economics 25th Anniversary Conference, University of Reading, 16-18 July.

Henry, E. (2000). Quality management standardisation in the French construction industry, singularities and internationalisation projects, Construction Management & Economics, 18, 6, 667-677.

Integrated Project Initiatives (2014). The Integrated Project Insurance (IPI) Model: Project Procurement and Delivery Guidance. IPI Ltd. Online resource: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/326716/20140702_IPI_Guidance_3_July_2014.pdf

Laryea, S and Hughes W (2011) Negotiating access into firms: obstacles and strategies, In: 6th Nordic conference on construction economics and organisation, 13-15 April, Copenhagen, Denmark.

Lewin, K. (1946). Action research and minority problems, Journal of Social Issues, 2, 34-36.

Miller, S and Doree, A (2008) Improving logistics in the asphalt paving process – what can we learn from the planner`s logic? In: Dainty, A (Ed.), 24th ARCOM conference, 1-3 September 2008, Cardiff. Association of Researchers in Construction Management, 381-390.

Parkin, P (2009) Managing change in healthcare: using action research. Sage Publications.

Reason, P (2003) Pragmatist philosophy and action research: readings and conversation with Richard Porty" Action Research, 1 (1), 103-123.

Reason, P & Bradbury, H (2007) "The Sage book of action research: participative inquiry and practice". 2nd ed. London; Sage.

Seymour, D, Mahroof, A, Rooke, J & Crook, D (1997) Objectivity in research: negotiating a research and development role in an urban renewal department. In: Stephenson, P (Ed.) 13th Annual ARCOM Conference, Cambridge, Association of Researchers in Construction Management, 455-463.

Zuber-Skerritt, O. (1996) New directions in action research. London: Falmer Press.